No. 753,331. PATENTED MAR. 1, 1904.

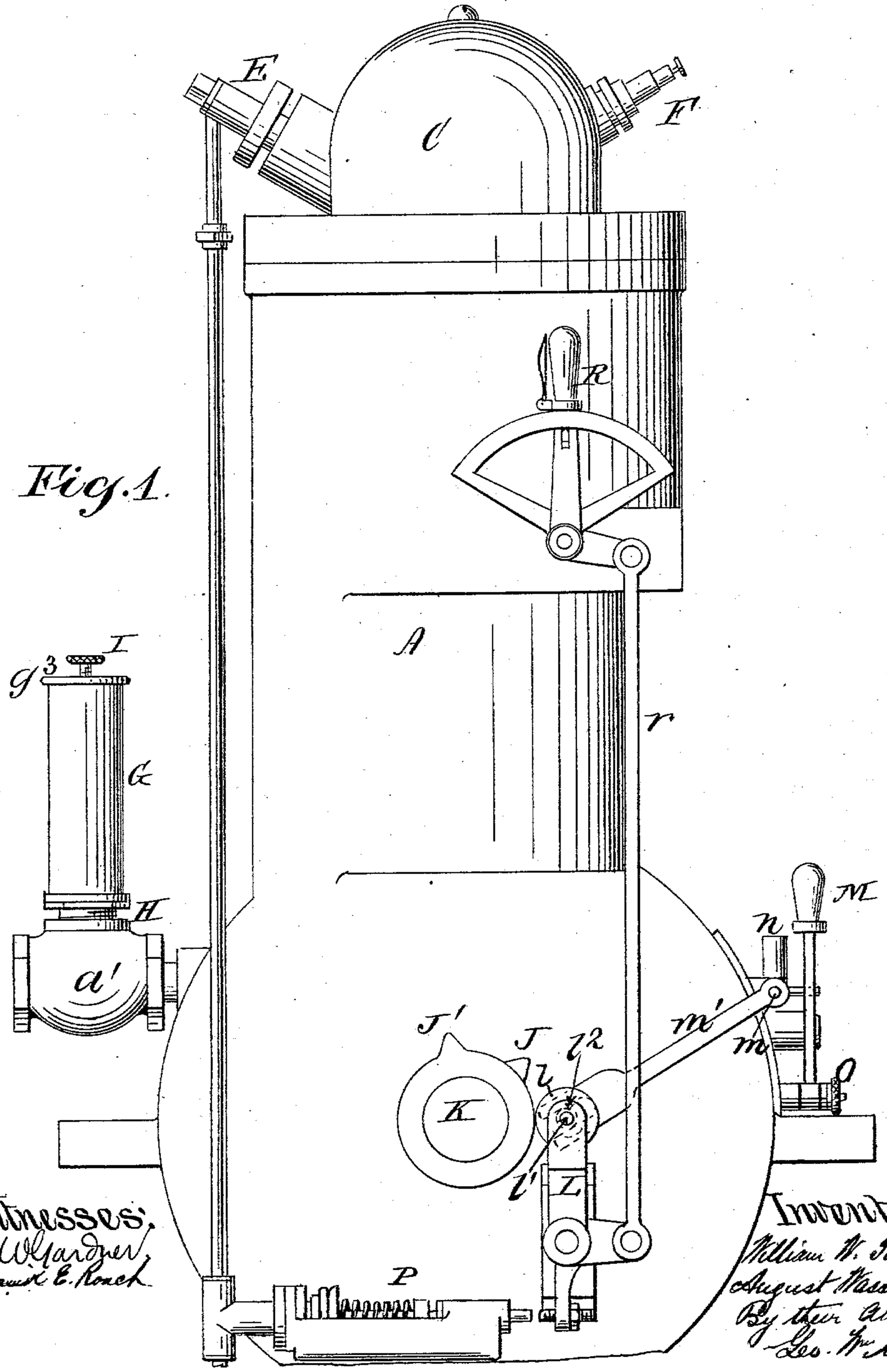
W. W. TUCK & A. WASSMANN.

HYDROCARBON VAPOR ENGINE.

APPLICATION FILED DEC. 26, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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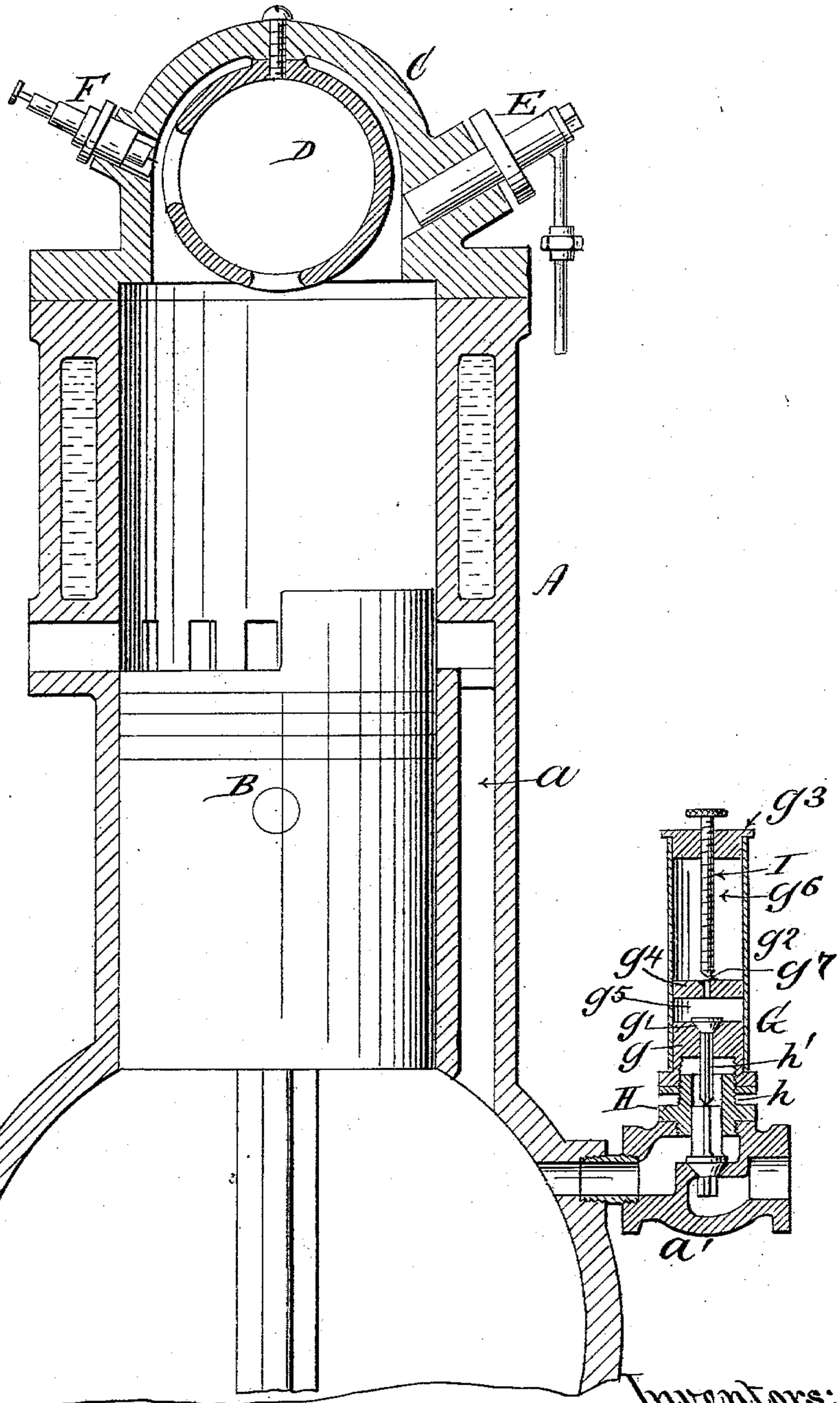
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

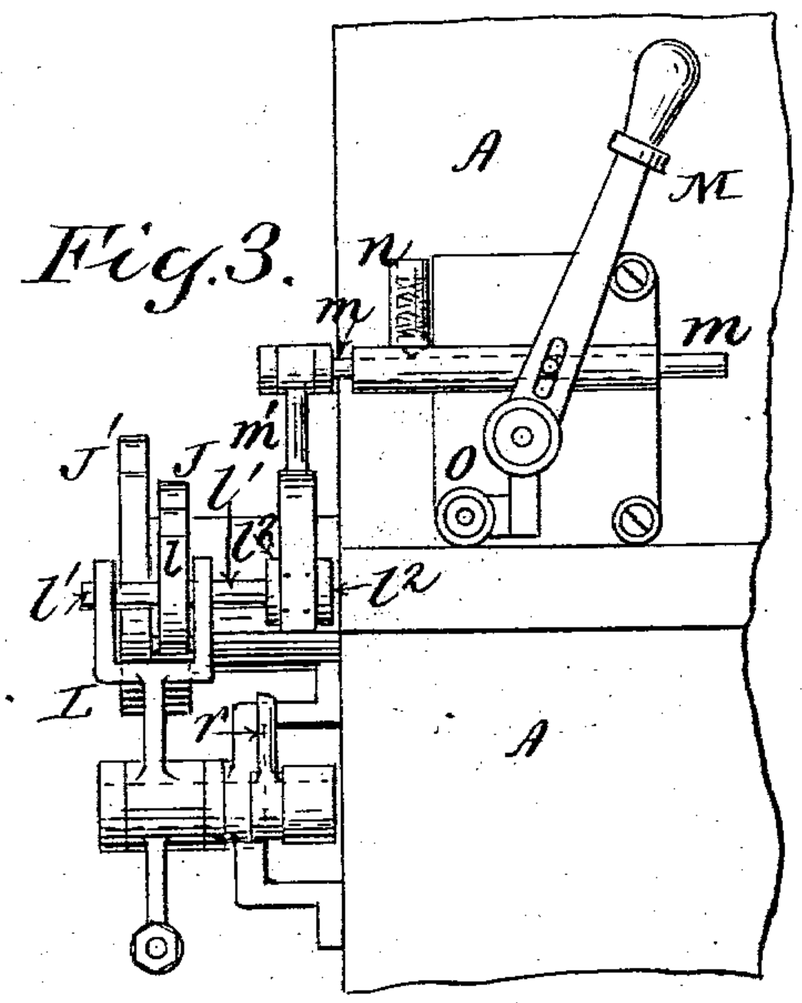


Fig. 4.

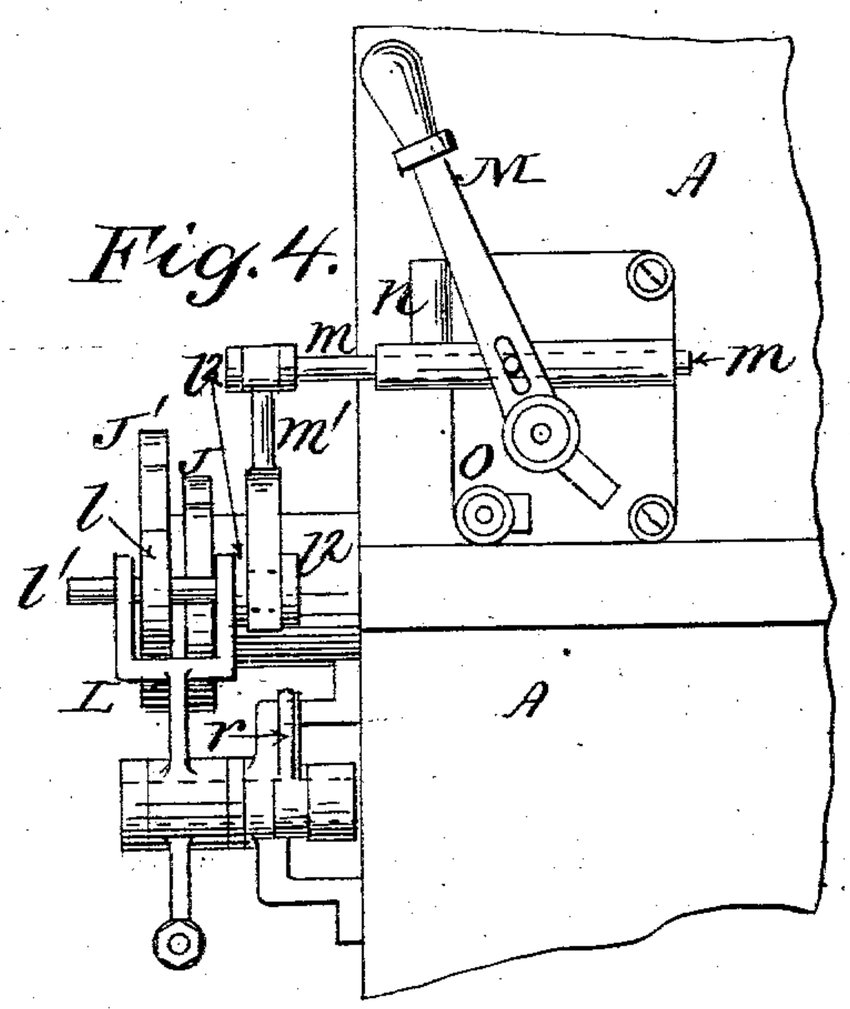
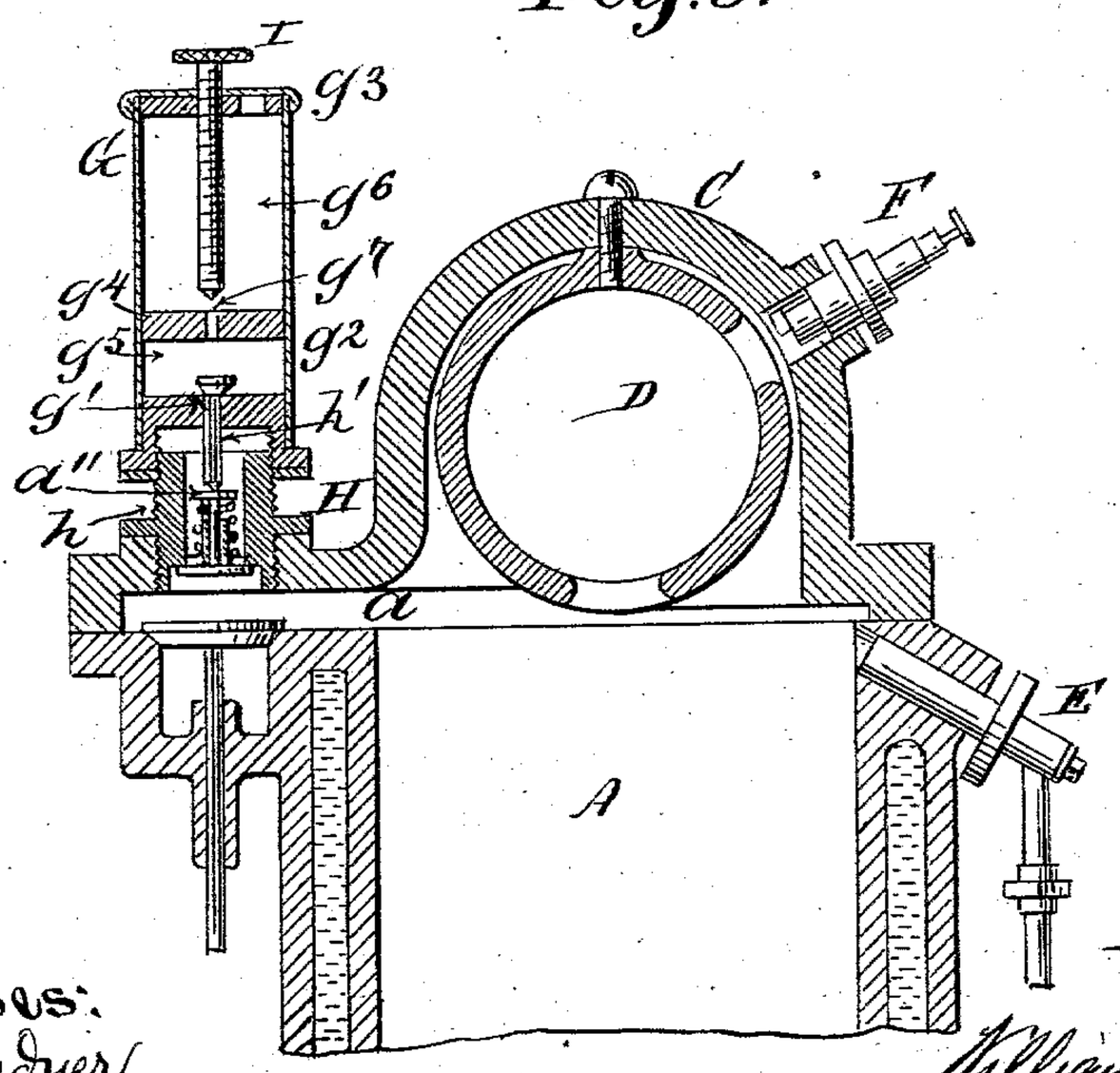


Fig. 5.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-VAPOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 753,331, dated March 1, 1904.

Application filed December 26, 1902. Serial No. 136,555. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. TUCK, residing at Richmond Hill, and AUGUST WASSMANN, residing at Halletts Point, Astoria, Queens county, State of New York, citizens of the United States, have invented certain new and useful Improvements in Hydrocarbon-Vapor Engines, of which the following is a specification sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

Our improvements relate to motors in which hydrocarbon vapor is exploded by means of an ignition-surface heated to the requisite degree, and particularly to the class of motors in which kerosene-oil is injected into the ignition-chamber to be vaporized and exploded. In this class of motors a preliminary heating of the ignition chamber or surface is essential before the engine will run continuously, and this preparatory heating has been effected in various ways, as by the application of external heat and other comparatively slow methods.

The main object of our present invention is to expedite this preliminary heating of the igniter; and the invention consists, primarily, in means permitting the use of mixed alcoholic vapor and air as an explosive mixture in conjunction with kerosene, whereby the volatile nature of the alcohol is utilized in effecting the first few explosions of the charge, an electric spark being used for the purpose and the electricity and the supply of alcohol being cut off as soon as the igniting-surface is heated sufficiently to vaporize and flash the kerosene injected against it.

Our invention also includes means for changing the time of the feed of kerosene during the use of the electric spark and alcohol-vapor and of returning the feed of kerosene to the normal time after the preliminary heating of the ignition-chamber has been effected, as well as certain minor features in the construction and arrangement of parts hereinafter described and claimed specifically.

In the accompanying drawings, Figure 1 is an elevation showing the parts of a kerosene two-cycle motor essential in illustrating the practical application of our invention. Fig. 2 is a central vertical section. Fig. 3 is an elevation of the oil-feed-timing mechanism and sparking switch. Fig. 4 is a similar view showing a different position of the parts. Fig. 5 is a section of the upper portion of a four-cycle kerosene-engine, showing a modification in the arrangement of the alcohol feed.

Referring to the drawings, A represents the piston-cylinder of a kerosene-oil engine, and B the piston which reciprocates therein.

C is the dome or combustion-chamber, in which is situated the ignition-bulb D.

E is the oil-injector of any desired or well-known construction, arranged to direct the succeeding charges of oil against the ignition-bulb D.

F is an electric-sparking device communicating with the combustion-chamber.

a is the air-induction passage, through which the air admitted through the air-valve *a'* passes to the portion of the cylinder A above the piston B.

Arranged to act in conjunction with the air-valve *a'* and opening into the air-induction passage *a* is the alcohol-feeding device G. Various appliances may be utilized for this purpose, and we do not confine ourselves strictly to the identical form and construction of parts shown in this respect, the essential feature being the provision of means whereby alcohol may be automatically drawn into the air-induction passage *a* along with the air admitted through the valve *a'*.

As shown in Figs. 1 and 2, H is a union the lower end of which screws into the casing of the valve *a'*, while its upper portion is formed with an external screw-thread *h*, which engages with a female screw-thread formed in the base *g* of the device G, said base *g* being also formed with the valve-seat *g'* for the valve *h'*, the lower end of the stem of which rests upon the upper portion of the valve *a'*, so that the opening of the air-valve *a'* raises the alcohol-valve *h'* from its seat *g'*. Fitted to the union *g* is a cylindrical casing g^2, which forms the reservoir for the alcohol, said reservoir-casing be-

ing closed at top by a removable cap g^3. Above the base g the reservoir-casing is divided by a horizontal partition g^4, forming a valve-chamber g^5 for the alcohol-valve h' below and the alcohol-chamber g^6 above. This partition g^4 is formed with a port g^7, controlled by a screw-plug or valve I. In Fig. 5 the arrangement is essentially the same, the only difference being that the stem of the valve h' rests upon the upper end of a spring puppet-valve a'', which latter opens downward, thereby lowering the valve h' to its seat and cutting off the alcohol in the valve-chamber g^5, the alcohol contained in the space between the two valves being admitted to the air-induction passage a, whereas in the arrangement shown in Figs. 1 and 2 the alcohol from the valve-chamber g^5 and from the reservoir above is free to flow downward as long as the air-valve a' is open.

It is to be understood, as heretofore intimated, that the electric sparking and the introduction of alcohol into the induced air-supply is desirable only in starting the engine or until such time as the ignition-bulb D acquires the degree of heat requisite to flash the charges of oil independently of the electric spark. During the use of the electric spark and vapor of alcohol the usual feed of oil occurs; but since it takes longer to explode the combined charge by means of the electric spark than it does by means of the ignition-bulb D when fully heated, it is desirable to introduce the oil at about one-third of the compression-stroke of the piston B when running under normal conditions, owing to the relatively greater heating-surface of the bulb D. For this reason we arrange two feed-cams J and J′ upon the cam-shaft K and make the roller l on the rocker-arm L, which operates the oil-pump P, adjustable with relation thereto, as will be seen by reference to Figs. 1 and 3 of the drawings, in which the positions of the roller l is controlled by the hand-lever M, acting through the slide m and arm m', the lower end of which latter is bifurcated and engages with shoulders l^2 l^2 on the roller-axle l'. A detent n holds the parts in either one extreme of thrust or the other, according to the cam to be brought into action indirectly upon the oil-pump. Incidentally the hand-lever M is used as a switch to throw into or out of electric circuit the sparking device F. Thus when the lever M is thrown over to bring the roller l into coincidence with the earliest acting cam J the lower end of said lever M is thrust against the electric contact O, and the circuit in which the sparking device F is interposed is completed.

In starting the engine it is only necessary to throw over the lever M to the right until its lower arm abuts against the contact O, the port g^7 being also opened by screwing up the plug I, when the first revolution of the crank-shaft by hand starts the operation, the alcohol mingling with the induced air-supply and being exploded by the electric spark and this being continued for the first few revolutions until the bulb D is sufficiently heated. When the port g^6 is closed by the screw-plug I, the lever M is reversed and the engine assumes its normal running condition.

The quantity of oil supplied by the pump P may be varied at any time, no matter which of the cams J J′ is in action, by means of the hand-lever and connections R r, controlling the rocker K in the usual manner.

The degree to which the valve h' is raised from its valve-seat g' is regulated by turning the cylinder g^2 upon the thread h, formed upon the upper part of the union H, thereby regulating the flow of alcohol to the air-induction passage a.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a kerosene-engine, means for introducing oil into the combustion-chamber thereof, means independent thereof for automatically introducing alcohol into the induced air-supply, and means for automatically changing the time of oil feed.

2. In a kerosene-engine, means for introducing oil into the combustion-chamber thereof, means independent thereof for automatically introducing alcohol into the induced air-supply, and means for automatically changing the time of oil feed and throwing the sparking device into electric circuit.

3. In a kerosene-engine, means for introducing oil into the combustion-chamber, means for causing an induced air-supply, means in addition to the oil-introducing means, and independent thereof for introducing alcohol into the induced air-supply, and means for simultaneously changing the time of oil feed and throwing a sparking device into electric circuit.

4. In a kerosene-engine, means for introducing oil into the combustion-chamber, means for introducing alcohol into the induced air-supply, means for exploding the combined charge by an electric spark, and means for simultaneously changing the time of oil feed and throwing the sparking device into electric circuit, substantially as and for the purpose described.

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